

Detailed Action

This Action is responsive to the Amendments received on 3/24/2009.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with John Hoel on July 15th, 2009.

The authorized amendments are stated below:

(1) Replace claim 1 with the following:

A method, comprising:

communicating digital data using an orthogonal frequency division multiplexing transmission system;

selecting a mode of operation in a transmitter among at least two modes, each mode of operation being associated with a number of active carriers for payload data transmission;

selecting a symbol interleaver in the transmitter from a plurality of symbol interleavers available for symbol interleaving in said selected mode of operation, wherein the selection of the symbol interleaver is based on a desired depth of interleaving;

applying the selected symbol interleaver in the transmitter on blocks of data units;

mapping the interleaved data units onto the active carriers of said selected mode of operation; and

wherein a number of data units in the blocks onto which the symbol interleaving is applied differs from the number of the active carriers in said selected mode.

(2) Cancel claim 2.

(3) In claim 3, line 1 change the following wording:

“A method according to claim 2” to

---A method according to claim 1---

(4) In claim 5, line 1 change the following wording:

“A method according to claim 2” to

---A method according to claim 1---

(5) In claim 7, line 1 change the following wording:

“A method according to claim 2” to

---A method according to claim 1---

(6) In claim 14, line 1 change the following wording:

“A method according to claim 2” to

---A method according to claim 1---

(7) Replace claim 15 with the following:

An apparatus, comprising:

a transmitter for communicating digital data using orthogonal frequency division multiplexing transmission, the apparatus having a plurality of modes of operation, each mode being associated with a predetermined number of active carriers used for transmitting payload data from the transmitter to a receiver;

a plurality of symbol interleavers in the transmitter, for symbol interleaving, a mode selector in the transmitter, for selecting a mode of operation for data transmission;

a symbol interleaver selector in the transmitter, for selecting a symbol interleaver from the plurality of symbol interleavers available for symbol interleaving in said selected mode of operation, wherein the symbol interleaver selector is adapted to make the selection based on a desired depth of interleaving;

whereby said selected symbol interleaver is applied in the transmitter on blocks of data units; and

wherein a number of data units in the blocks onto which the symbol interleaving is applied differs from the number of the active carriers in said selected mode.

(8) Replace claim 19 with the following:

An apparatus, comprising:

a receiver for communicating digital data using orthogonal frequency division multiplexing communication, the apparatus having a plurality of modes of operation, each mode being associated with a predetermined number of active carriers used for transmitting data units from a transmitter to the receiver, the transmitter further having a plurality of symbol interleavers to be used for symbol interleaving;

a control block in the receiver, configured for recognizing a symbol interleaver of the plurality used in the data transmission, based on information received about the used symbol interleaver, the symbol interleaver having been selected based on a desired depth of interleaving, wherein said selected symbol interleaver is applied in the transmitter on blocks of data units and a number of data units in the blocks onto which the symbol interleaving is applied differs from the number of the active carriers in said selected mode;

a plurality of symbol de-interleavers in the receiver for de-interleaving received data units which have been interleaved at the transmitter in the symbol interleaver; and said control block further configured for selecting a symbol de-interleaver from the plurality of symbol de-interleavers corresponding to the recognized symbol interleaver.

(9) Replace claim 24 with the following:

A system, comprising:

a digital data communicating system using an orthogonal frequency division multiplexing transmitting system comprising at least one transmitter and at least one

receivers, the system having a plurality of modes of operation, each mode being associated with a predetermined number of active carriers used for transmitting payload data from a transmitter to at least one receiver, the transmitter having a plurality of symbol interleavers to be used for symbol interleaving on blocks of data units at the transmitter, the at least one receiver having a plurality of symbol de-interleavers for de-interleaving the interleaved data units at the receiver;

 a mode selector in the transmitter for selecting a mode of operation to be used in data transmission;

 a symbol interleaver selector in the transmitter for selecting a symbol interleaver for symbol interleaving in a selected mode of operation, wherein the symbol interleaver selector is adapted to make the selection based on a desired depth of interleaving;

 wherein said selected symbol interleaver is applied in the transmitter on blocks of data units and a number of data units in the blocks onto which the symbol interleaving is applied differs from the number of the active carriers in said selected mode;

 an inner interleaver in the transmitter for applying symbol interleaving on blocks of data units;

 a control block in said at least one receiver configured for recognizing the symbol interleaver used in the data transmission; and

 the control block in said at least one receiver further configured for selecting a symbol de-interleaver from a plurality of symbol de-interleavers corresponding to the recognized symbol interleaver.

(10) Replace claim 28 with the following:

A method, comprising:

communicating digital data using an orthogonal frequency division multiplexing transmission system including at least one transmitter and at least one receiver, the system further having a plurality of modes of operation, each mode being associated with a predetermined number of active carriers used for transmitting data units from said at least one transmitter to the at least one receiver;

receiving, in the at least one receiver, interleaved data units and information of a symbol interleaver used for symbol interleaving at said at least one transmitter;

recognizing in the at least one receiver, based on said received information of the used symbol interleaver, a symbol interleaver used in the data transmission, the symbol interleaver having been selected based on a desired depth of interleaving;

wherein said selected symbol interleaver is applied in the transmitter on blocks of data units and a number of data units in the blocks onto which the symbol interleaving is applied differs from the number of the active carriers in a select mode of the plurality of modes of operation;

selecting a de-interleaver in the at least one receiver to correspond to the recognized symbol interleaver; and

de-interleaving in the at least one receiver the received data units using the selected de-interleaver.

Allowable Subject Matter

2. Claim 1, 3-8, and 10-32 are allowed.

3. The following is an examiner's statement of reasons for allowance:

The present invention is a system, method, and apparatus for symbol interleaving and de-interleaving in an orthogonal frequency division multiplexing (OFDM) communication system, which has a plurality of operation modes, each mode using a predetermined number of active carriers for OFDM communication, where a plurality of symbol interleavers (or de-interleavers) is available for use in each mode. The closest prior art, Sudo (United States Patent Number 6,950,474) shows a similar invention including an OFDM communication system which selects a mode of operation wherein a mode is associated with a number of active carriers for payload data transmission; and the selected symbol interleaver is applied on blocks of data units and the interleaved data units are mapped onto the active carriers in said mode of operation, a receiver which recognizes the symbol interleaving used in data transmission and performs the corresponding de-interleaving of the received interleaved data. However, Sudo fails to disclose selecting a symbol interleaver from a plurality of symbol interleavers as claimed, the claimed relationship between the selected symbol interleaver and active carriers, the selection of a symbol de-interleaver as claimed, and depth of interleaving as claimed. The distinct features have been added to independent claims 1, 15, 19, 24, and 28, therefore rendering claims 1, 3-8, and 10-32 allowable.

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES M. PEREZ whose telephone number is (571)270-3231. The examiner can normally be reached on Monday through Friday: 9am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James M Perez/
Examiner, Art Unit 2611
7/16/09
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611

Application/Control Number: 10/522,689
Art Unit: 2611

Page 10